We are all familiar with process adjustments that can be made to reduce warp (i.e. adjusting injection pressure, pack time, pack pressure, etc.). Unfortunately, semi-crystalline polymers cannot obtain the same flatness of amorphous polymers and often optimal process conditions still do not significantly reduce warp. Moreover, materials that are prone to warpage such as glass filled PA66 or glass filled PBT, are typically selected because they offer specific properties such as chemical or high heat resistance that standard amorphous materials cannot achieve. Below are some proven semi-crystalline material solutions that can help you combat warp without sacrificing the standard properties you would expect from resins within this family.

**Xarec NWA Grades**
*Reinforced Nylon 66 with low warp high performance alloy*

<table>
<thead>
<tr>
<th></th>
<th>Crystalline Density (g/cm³)</th>
<th>Amorphous Density (g/cm³)</th>
<th>Difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xarec</td>
<td>1.05</td>
<td>1.05</td>
<td>0</td>
</tr>
<tr>
<td>PPS</td>
<td>1.43</td>
<td>1.32</td>
<td>7.7</td>
</tr>
<tr>
<td>PBT</td>
<td>1.41</td>
<td>1.28</td>
<td>9.2</td>
</tr>
<tr>
<td>PA66</td>
<td>1.23</td>
<td>1.08</td>
<td>12.2</td>
</tr>
<tr>
<td>PA46</td>
<td>1.28</td>
<td>1.08</td>
<td>15.6</td>
</tr>
</tbody>
</table>

**Over 50% Reduction in Warp in molded 4-sided tray due to low warp PA66 and SPS alloy**
**Technylstar PA6 and PA66 Compounds**

High Fluidity fast crystallization PA6 and PA66 to minimize molded in stress and warp.

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**Over 25% Reduction in Warp in molded firearms component**

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**PC/PBT Alloys**

Combining the chemical resistance benefits of PBT and Impact Properties of PC. The PC fraction also reduces shrink helping to control warp.

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Customer required:

- Low Temperature Impact
- **Low Warp**
- Good Chemical Resistance to cleaning agents, gas, and oil.
- Good weather-ability

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Scooter Fascia

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Customer was unable to achieve a dimensionally acceptable part with impact modified nylon or impact modified PBT. PC/PBT offered a good balance of all properties with lower warp!